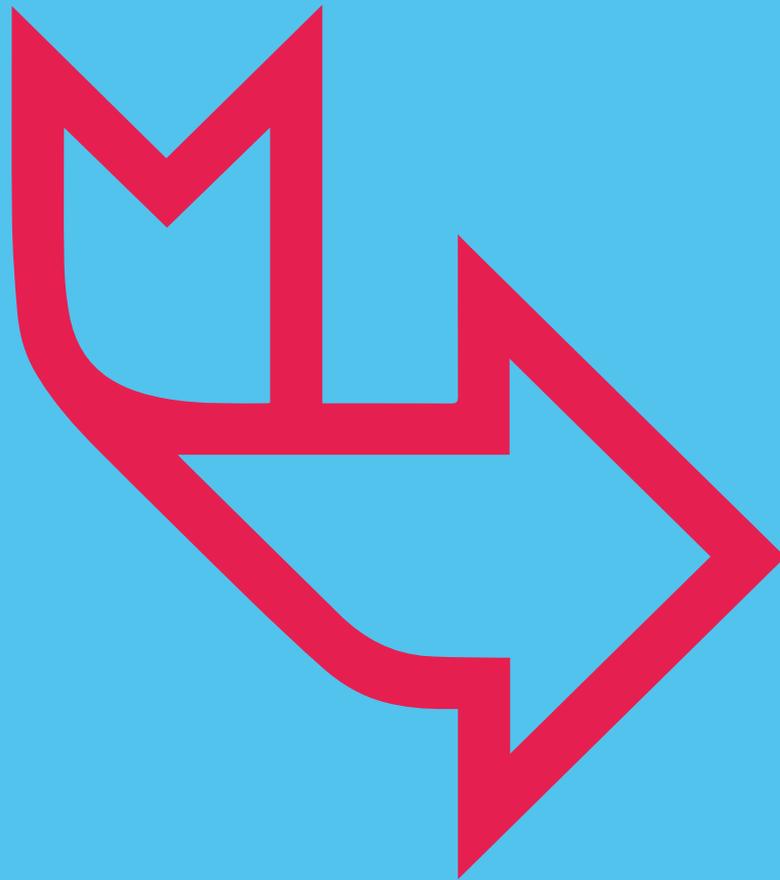


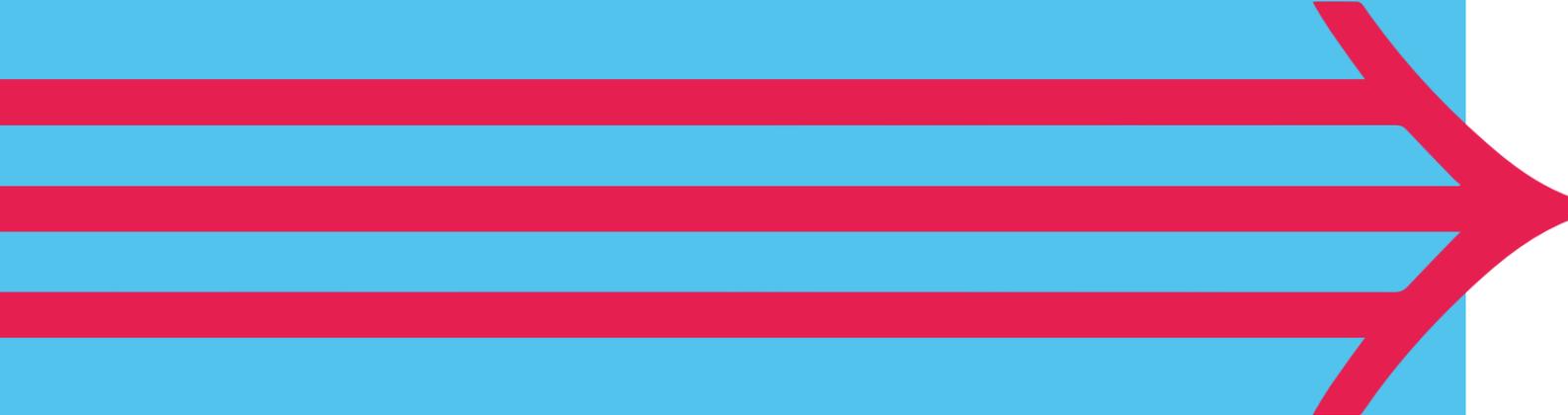


**DevOps Engineer
Apprenticeship
Level 4**

**A Digital by Design
programme**



PROGRAMME GUIDE



CONTENTS

What does “Digital by Design” mean?

It means a greater focus on online learning together with using face-to-face interaction where it adds the most value for learners.

It means that there is a single learner journey which brings teaching, coaching, learning and assessment into a single, repeatable flow for every module.

It means that there is a clear focus from the beginning of the programme on successful completion of the End-Point Assessment (EPA).

In Digital by Design, these three elements will work together:

- The Content
- The Service and Support
- The Technology

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ROLE PROFILE

DevOps Engineer

DevOps Engineers are focused on implementing and facilitating the use of DevOps practices within a business. This encompasses multiple stages of the software development life cycle, automating processes around development, testing and release for continuous integration of new features, and subsequent continuous delivery of a product.

DevOps Engineers will typically work as part of a larger team and will need context of both the development and technical operations aspects of a project in order to streamline communication between teams. They are expected to interpret design documentation and specifications defined and delivered by specialist members of the team, such as a business analyst or technical architect.

DevOps Engineers need:

- Strong logical reasoning and problem-solving skills
- A methodical, step-by-step approach
- Attention to detail
- Business skills like effective communication, teamwork and task/time management
- The ability to troubleshoot issues where needed
- The ability to work under direction, use discretion and determine when to escalate issues

JOB ROLE SUITABILITY

To help you determine whether a candidate (a new hire or existing employee) will be working in a suitable job role to successfully complete this programme, you must be able to answer “yes” to the following questions.

Will they be doing a full-time technical role revolving around coding, operations and the cloud?

Will they be responsible with deployment of code into enterprise environments?

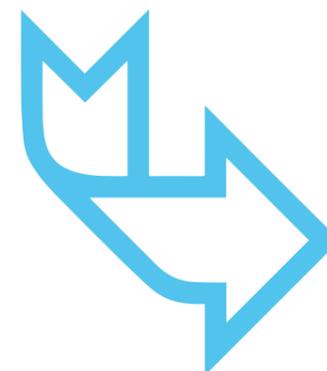
Will they be responsible for infrastructure and code pipeline projects and tasks?

Will they be actively involved with coding in at least one programming language?

Will they be responsible for writing scripts and automation tasks?

Will they be working with databases and connecting to databases?

Will they be responsible for project-wide environment management both locally and in the cloud?



Speak to your Account Manager for more advice on eligibility and job role/existing staff suitability for this programme.

QUALIFICATIONS EARNED

By completing the DevOps Engineer Level 4 apprenticeship, learners will earn the following qualifications:

Level 4 DevOps Engineer

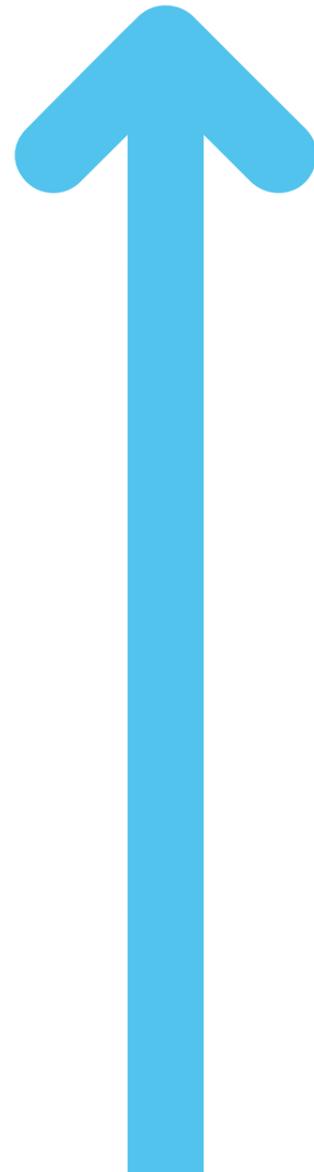
Evidencing 20% off-the-job learning

This 20% off-the-job learning is an apprenticeship requirement. It must be completed in working hours.

Our programme facilitates off-the-job learning.

We blend online learning, on-the-job learning, and classroom training in a seamless way.

We are the apprenticeship experts and can advise you on this topic.



DISCOVER, PRACTICE AND APPLY

Discover, practice and apply are the three pillars of apprenticeship learning.

No matter what part of the apprenticeship a learner is on, discover, practice and apply are combined into each activity.

Discover

Learners will learn the theory, by exploring subjects online and in the classroom.

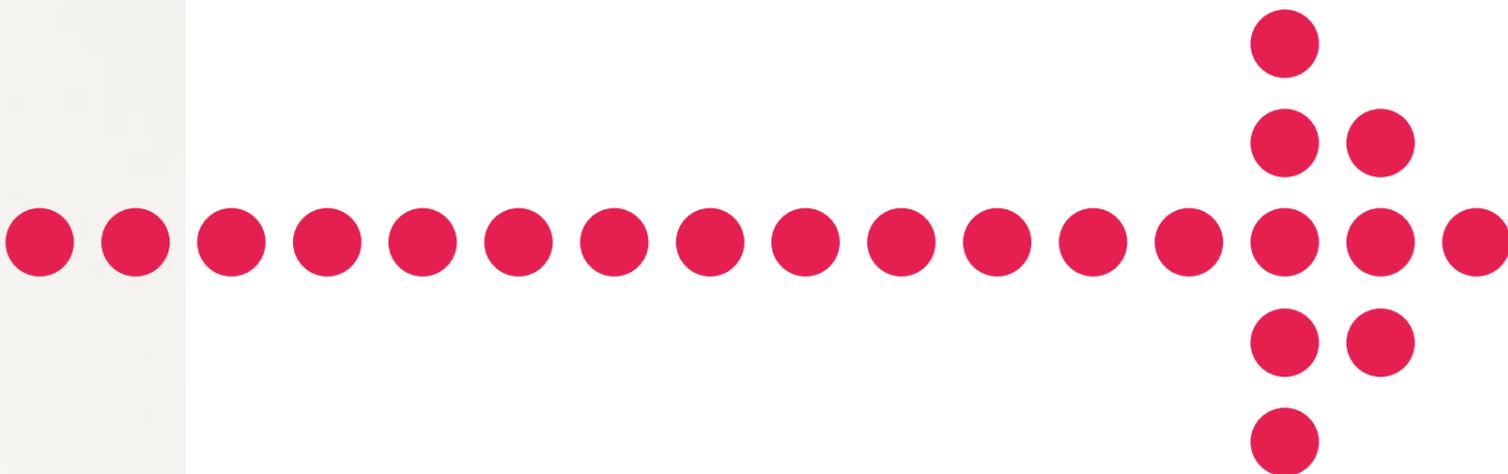
Practice

Learners will practise their new-found knowledge by completing activities - online, in the classroom and (most importantly) directly at work in their day-to-day role.

Apply

Learners will apply what they've discovered and practised at work. They will actively contribute to your organisation whilst building their portfolio of evidence (showing how they've applied their new skills) to gain their qualification.





INTRODUCING... DIGITAL LEARNING CONSULTANTS

In the new world of apprenticeships, learners will be taken through their programme by a team of people called Digital Learning Consultants, or DLCs for short (they're subject matter experts).

On-programme support:

- **3, 2, 1...launch!** The structured programme launch is tailored to the learner and focussed on learning engagement and setting expectations.
- **More help for learners.** Any Digital Learning Consultant can support any learner - so no waiting around for a specific person to be available (this is called a many-to-many approach).
- **Digital first.** Using digital, you're connected to help. Face-to-face visits are only arranged when specific help is required.
- **Faster.** We provide feedback on submissions within 24 hours.
- **Group sessions.** There are still regular, planned group guidance sessions to get the benefit of working with others.
- **EPA Readiness.** We check-in regularly, with planned EPA readiness checks that demonstrate distance travelled through the apprenticeship and highlight areas for development.
- **Data driven.** We proactively monitor data to identify learners at risk of falling behind. We take action to re-engage them with their apprenticeship to make sure they stay on track to achieve and remain on the programme.
- **Right learner, right role, right time.** We have developed a 5-week initial support plan to make sure the right learner is in the right role at the right time. This is essential to success.



THE APPRENTICESHIP PROGRAMME

DevOps Engineer Level 4

This apprenticeship is typically 18 months long. The minimum duration of the practical period is 15 months, and then 3 months for EPA. Some learners may finish their programme in less time if their EPA is completed quickly.

This flowchart shows how learners progress throughout the apprenticeship and how the whole programme uses our blended approach to learning.

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GETTING STARTED

After enrolling in the programme, learners will attend an online session. This will give them an overview of the programme and a hands-on introduction to their first module: Devops Culture and Methodologies.

This will give them an overview of the programme and an introduction to Agile, CI/CD and DevOps, with hands-on work with source control.

REMAINING MODULES MONTHS 3-15

Learners work through 5 modules, which include online learning material on a virtual learning environment, classroom sessions, and hands-on application in their job.

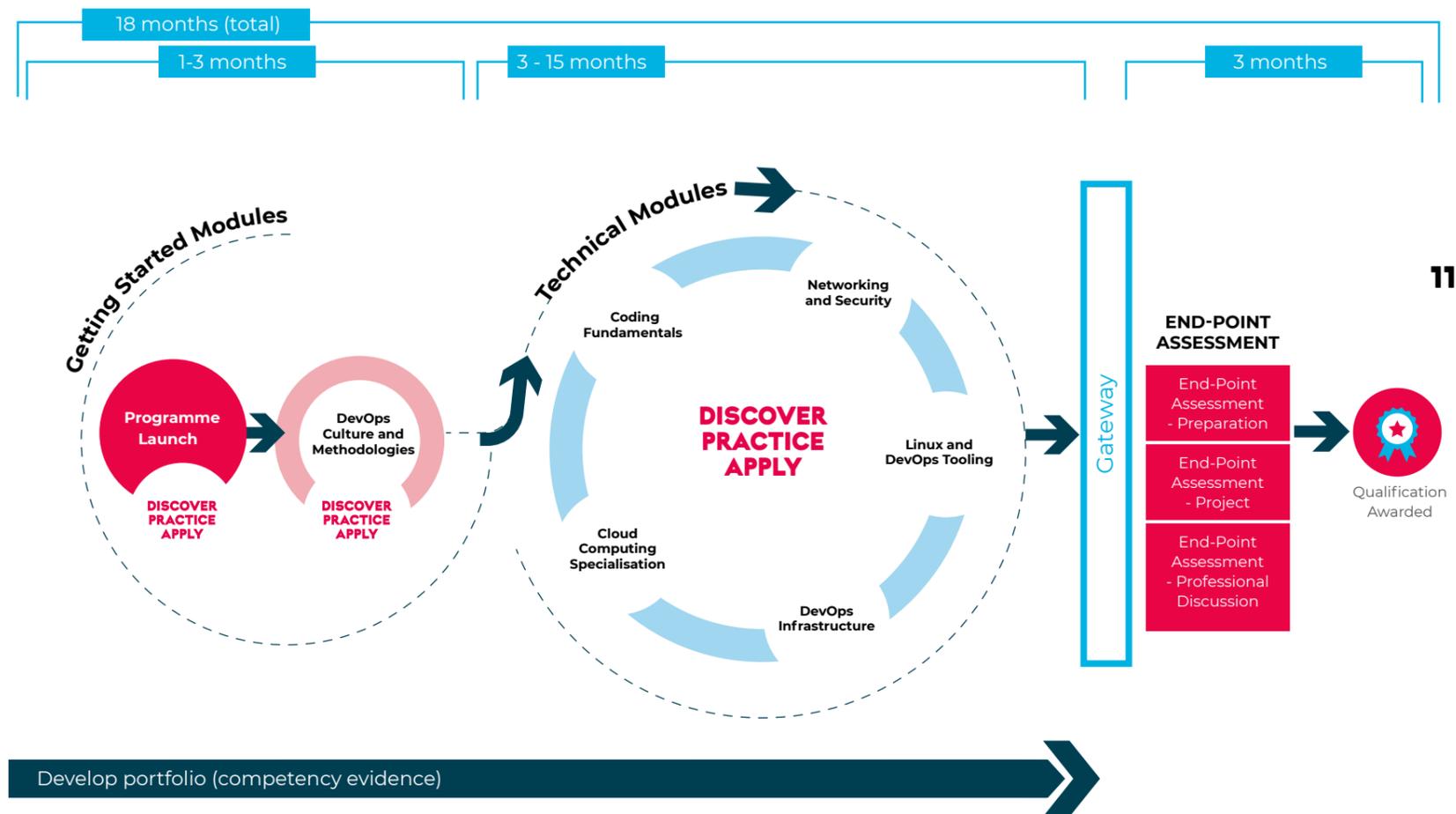
Learners will also build their portfolio and have regular check-ins with a Digital Learning Consultant (DLC) and their line manager.

GATEWAY 3 MONTHS BEFORE LEARNER'S TARGET END DATE

Learners will go through the 'gateway' stage when they have completed all knowledge modules and portfolio work.

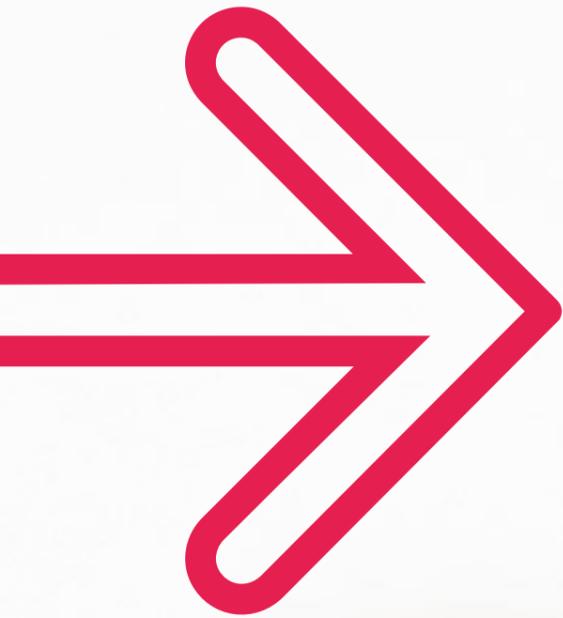
EPA MONTHS 15-18

Learners complete their End-Point Assessment.



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Level 2 functional skills, English and maths must be passed as part of the programme (if not already) and certificates presented, prior to taking the End-Point Assessment. This will be discussed at programme launch.



GETTING STARTED

The modules in our DevOps Engineer apprenticeship equip learners with the advanced technical skills they need for their role. Each module develops the core set of skills they must be able to do well to be competent.

In each module, learners will 'discover', 'practice' and 'apply' what they've learned. This helps them put their newly-found knowledge into action back at work.

There are 6 modules to complete with the following learning outcomes.

Module 1: DevOps Culture and Methodologies

Module duration: 8 weeks | **Classroom attendance:** 3 days

Discover. Practice. Apply.

This module will introduce learners to the common practices whilst working in a DevOps environment, including Agile, Scrum, Continuous Integration and Continuous Delivery. The module also introduces the fundamentals of Cloud Computing alongside Version Control with Git.

This will include:

- Agile values, characteristics
- Scrum roles, artefacts, values
- Estimation and Planning
- DevOps as a Culture
- Intro to Continuous Integration and Continuous Delivery
- Environments and Containers
- Infrastructure Consistency
- Cloud Introduction
- Cloud Deployment Models
- Introduction to Source Control
- Git Fundamentals
- Git cloning and forking
- Merging and reverting
- Pull requests
- Jenkins build server – intro, install, configuration
- Managing and running builds
- Version control and Jenkins

REMAINING MODULES

The remaining modules focus on the knowledge and skills required of a Infrastructure Technician in detail. After each module learners will 'apply' what they've learned at work on current projects.

Module 2:

Coding Fundamentals

Module duration: 8 weeks | **Classroom attendance:** 7 days

Discover. Practice. Apply.

This module will focus on the developer skills needed for learners to create applications through Python with connected databases, practicing TDD and OOP when applicable.

This will include:

- Python Programming Basics
- Working in TDD
- Data Types
- Control Flow, Iteration
- Lists and Arrays
- Functions
- Working with Files
- Python and Databases
- Python OOP
- Collections and Generics
- Testing in Python
- SOLID principles

Module 3:

Networking and Security

Module duration: 8 weeks | **Classroom attendance:** 3 days

Discover. Practice. Apply.

This module will introduce learners to networking and security principles both generally and within a DevOps context.

This will include:

- Networking Basics
- Networking Models
- Routing and IP Addresses
- Network Address Translation
- Security
- Security Basics
- Authentication and Authorization
- Security Attacks
- Passwords
- Hashing vs Encrypting vs Encoding
- Introduction to DevSecOps
- Pen Testing, DAST & SAST

Module 4:

Linux and DevOps Tooling

Module duration: 12 weeks | **Classroom attendance:** 7 days

Discover. Practice. Apply.

This module will take a deep-dive into the build and environment tools within DevOps, discussing the design and construction of pipelines within DevOps CI/CD to support application development, building, testing and release within a local and cloud-based context.

This will include:

- Basic cloud configuration (AWS)
- Linux files and directories, management of files
- Linux file structure
- Linux bash interpreter and terminal
- Linux user and file administration, ownership, sudo
- Data streams, pipes, filters
- Scripting in Linux
- Linux Networking and Security
- Creating artefacts
- Pipeline as Code
- Pipeline security
- NGINX Introduction and Configuration
- HTTP Reverse Proxy Configuration
- Web Server Configuration
- Containerisation basics
- Building and deploying containers
- Creating Dockerfiles, managing Docker volumes
- Resource sharing
- Docker compose, Docker swarm
- Containerisation Security principles
- Kubernetes Introduction
- kubectl Pods
- Namespaces
- ConfigMaps
- Labels & Selectors
- Sidecar Model
- Logging
- Prometheus Configuring with Kubernetes
- Managing Container Resources
- Network Policies
- Secrets
- Security Contexts

Module 5:

DevOps Infrastructure

Module duration: 12 weeks | **Classroom attendance:** 5 days

Discover. Practice. Apply.

This module will focus on the developer skills needed for learners to create applications through Python with connected databases, practicing TDD and OOP when applicable.

This will include:

- Introduction to APIs
- Building APIs
- Ansible Introduction
- Inventory
- Playbooks
- Variables
- Ansible Tower
- Terraform Introduction
- HashiCorp Configuration language
- Data types, variables
- Providers and Resources
- Terraform Syntax
- Configuration file discovery

Module 6:

Cloud Computing Specialisation

Module duration: 8 weeks | **Classroom attendance:** N/A

Discover. Practice. Apply.

This module will focus on the specifics of a cloud vendor – AWS, Azure or GCP – including developing and architecting DevOps solutions and pipelines on the platform.

This will include:

- AWS, Azure or GCP
- Core services – computing, storage, networking
- Security Services, Monitoring and Auditing
- Developing with the platform
- CI/CD
- Web application building
- Decoupled apps
- Code committing and deployment
- API management
- Architecting with the platform
- Migrating to the cloud, business usage
- Serverless Computing, Serverless Functions
- Lambda, APIs, storage and databases
- Containerisation and container releases

Gateway and End-Point Assessment

Consolidation, Preparation and Assessment (Online)

Duration: 5 learner-led weeks + EPA

This final component will get learners ready to go through the 'gateway'. The apprenticeship gateway is an internal QA process. It will ensure that your learner's work is ready to be assessed by BCS. This exists to increase their chances of success.

At this pre-gateway stage learners will:

- Consolidate and submit their portfolio
- Conduct a mock EPA

In addition to the items above, learners must have successfully completed all the Functional Skills exams (except exempted learners).

Once learners have met all the above criteria, they will go through the gateway. When approved, it takes 3 months from gateway to achievement. During this time, learners will:

- Complete their project
- Complete their professional discussion



LEARNING OUTCOMES

As well as being assessed on their technical knowledge, learners are also assessed on their ability to demonstrate the following competencies through their portfolio and interview.

This ensures balanced development – as the competency standards provide a greater emphasis on the importance of both technical and soft skills relevant to their role in the workplace.

QA DLCs will help apprentices build their portfolio and record these skills throughout the programme.

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Logic and Problem Solving

- Write good quality code with sound syntax in at least one language
- Apply good practice approaches according to the relevant paradigm (OOP, TDD)
- Apply structured techniques to problem solving
- Debug code and understand the structure of programmes

Environment Management

- Design and deploy environments on an individual and group/project-wide scale
- Manage environments both locally and within the cloud

CI/CD

- Understand all stages of the software development lifecycle, with increasing breadth and depth over time with initial focus on deployment of projects
- Utilise skills to build, manage and deploy code into enterprise environments
- Apply automation and scripting techniques to streamline any and all activities within development, testing and deployment

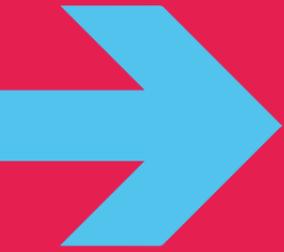
Business Skills

- Respond to the business environment and business issues related to software development.
- Operate effectively in their own business's, their customers' and the industry's environments.
- Understand how teams work effectively to produce software and contribute appropriately.

Skills and Behaviours

Apprentices will also need to show they have demonstrated the following skills and behaviours in their role:

- Logical and creative thinking skills.
- Analytical and problem-solving skills.
- Able to work independently and to take responsibility.
- Use own initiative.
- Take a thorough and organised approach.
- Able to work with a range of internal and external people.
- Able to communicate effectively in a variety of situations.
- Maintain a productive, professional and secure working environment.



HOW TO GET READY FOR THE END-POINT ASSESSMENT

We want to deliver memorable learning experiences, whilst developing learners with well-rounded skillsets, ready to meet their professional requirements.

To ensure we are achieving this goal consistently, it is important for learners, DLCs and employers to work together to ensure learners are supported to succeed in their Apprenticeship's third-party End-Point Assessment (EPA).

In this section we outline a number of guidelines which intend to provide a framework so that can be achieved in a consistent way.

Preparation for the End-Point Assessment starts from day one.

STAYING ON-TRACK THROUGHOUT THE PROGRAMME

The EPA preparation starts as soon as each new learner joins a programme, as all its components will support the learner to develop the necessary technical knowledge, skills, and behaviours to confidently meet, or exceed, all the requirements specified in the standard.

For this reason, it is very important to keep learners, DLCs and employers informed about the expected programme progress plan. It is critical to the success of the apprenticeship programme that all of the above work together to ensure that each learning journey is kept on-track avoiding further interventions (and time commitment) whenever possible.

To help learners with this, we have created two guiding documents – a programme timeline, and a progress review map – so progress can be checked against it, at any time. Any progress deviations above 20% will be reviewed on a case-by-case basis. This is to ensure the apprenticeship is progressing in a timely manner.

HOW THE EPA IS GRADED

After the EPA interview, the assessor will make a holistic judgement of the apprentice's performance across all four assessment methods based on three criteria:

1

WHAT

What has been learned

2

HOW

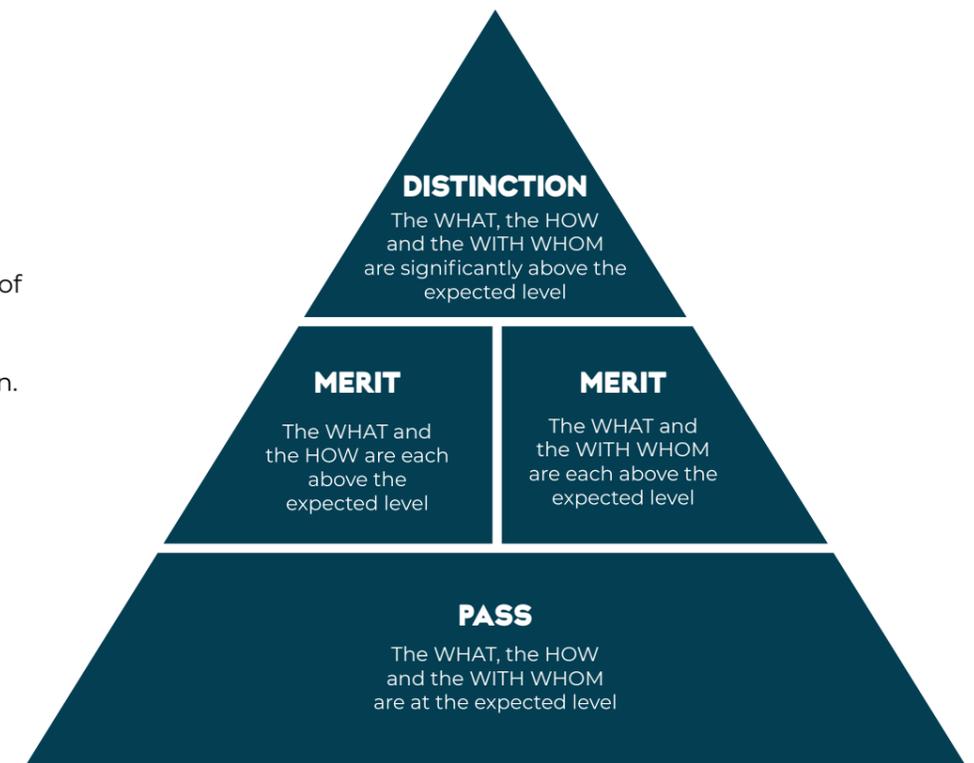
The way the work was done

3

WITH WHOM

The personal and interpersonal qualities brought to working relationships

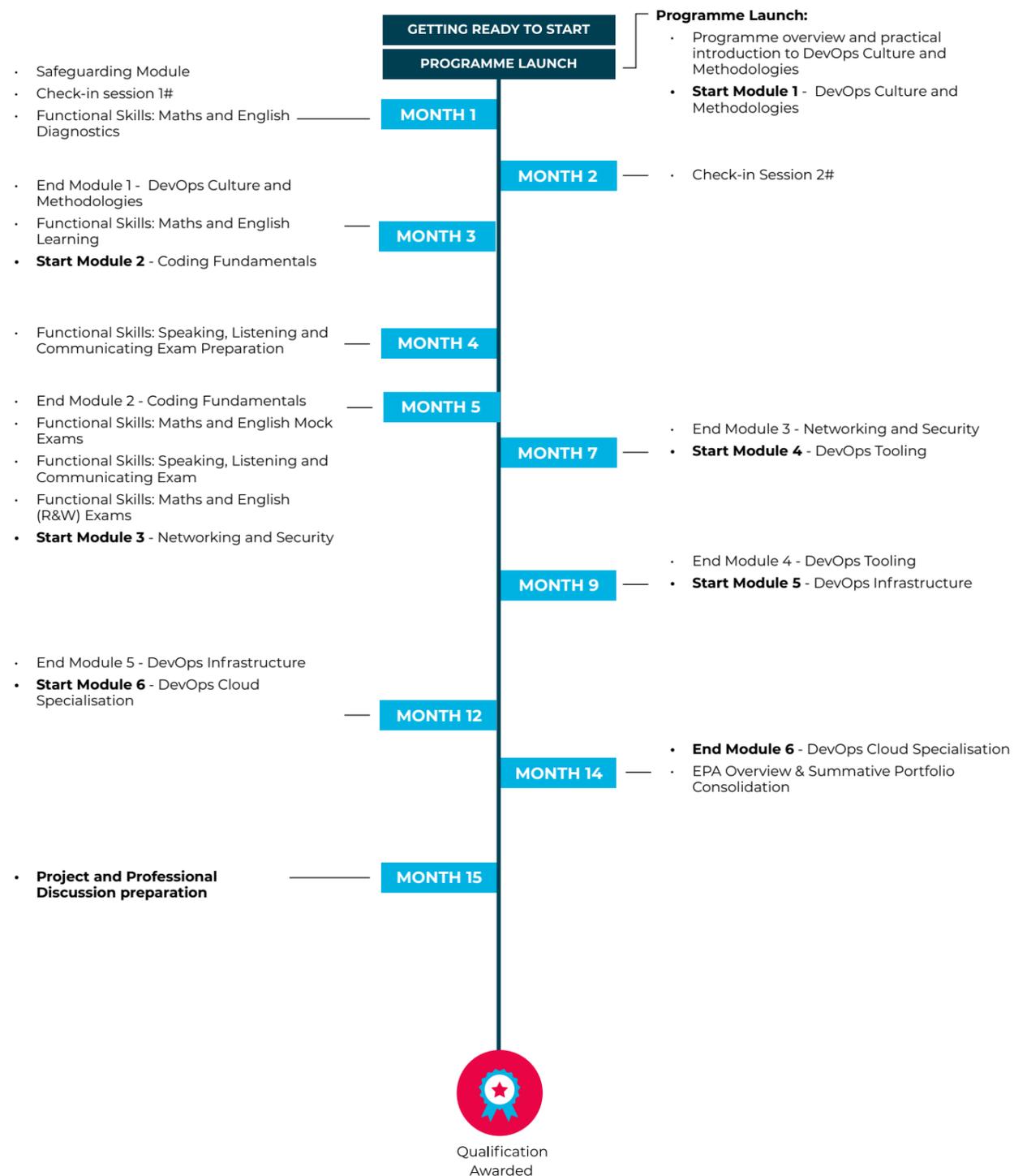
The learner will receive a single grade for their entire apprenticeship: **Pass, Merit or Distinction.** For an in-depth understanding of grading, please refer to the assessment plan.



THE LEARNER'S JOURNEY

DevOps Engineer L4

Programme timeline | Duration: 18 Months | Gateway: 15 Months



THE LEARNER'S JOURNEY

DevOp Engineer L4

Programme timeline | Duration: 18 Months | Gateway: 15 Months



This diagram gives an estimate of what progress looks like in this learning journey. It covers specific time frames for illustration purposes only. Each learner will see their progress percentage update live, as they complete activities in Bud.

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MONTH 3

Completion by end of month 3	Completion %
Activity 1.1: Programme overview and practical introduction to DevOps Culture and Methodologies: Discover and Practice (Online)	Complete
Survey: Start of Programme	Complete
SG1: Safeguarding Module	Complete
Activity 1.2: DevOps Culture and Methodologies: Discover and Practise (Online & Classroom)	8%
CS1: Check-in session 1#	Complete
FS1: Functional Skills: Maths and English Diagnostics	Complete
CS2: Check-in session 2#	Complete
Survey: Early Engagement	Complete
Activity 1.3: DevOps Culture and Methodologies: Apply & Prove (Online & Workplace)	13%
FS2: Functional Skills: Maths and English Learning	Complete

By the end of month 3:
A learner should have completed **13%** of their programme

MONTH 6

Completion by end of month 6	Completion %
Activity 2.1: Coding Fundamentals: Discover & Practice (Online & Classroom)	25%
FS3: Functional Skills: Speaking, Listening and Communicating Exam Preparation	Complete
Activity 2.2: Coding Fundamentals: Apply & Prove (Online & Workplace)	30%
Survey: On-programme Evaluation	Complete
FS4: Functional Skills: Maths and English Mock Exams	Complete
FS5: Functional Skills: Speaking, Listening and Communicating Exam	Complete
FS6: Functional Skills: Maths and English (R&W) Exams	Complete
Activity 3.1: Networking and Security: Discover & Practice (Online & Classroom)	38%

By the end of month 6:
A learner should have completed **38%** of their programme

Note: by the end of month 6 all the Functional Skills components will be completed.



Is the learner on track?

QA will be monitoring each learner's progress on an on-going basis.

At any point, they will be in one of three categories:

- **Green:** on track, or 0-5% behind target progress.
- **Amber:** 6-14% behind target progress.
- **Red:** 15% or more behind target progress.

Whenever deemed required, QA will put in place proactive measures to get learners back on track.



How is the learner performing?

QA will continuously track the quality of each learner's work, and discuss performance:

- At every **activity submission**. The work submitted will be reviewed and discussed with the learner. This will happen in the messaging system, inside each activity.
- At **EPA readiness checks**. The first of these checks will happen on the week following programme launch. After that, at every 16 weeks. This will take place in the form of a scheduled call.

Either way, our feedback will let the learner know how they are performing. We may ask learners to refine their work, or complete extra tasks, before approving it. These interactions will use Bud virtual learning environment, where they will be recorded.

66% PROGRESS

MONTH 9

Completion by the end of month 9	Completion %
Activity 3.2: Networking and Security: Apply & Prove (Online & Workplace)	44%
Activity 4.1: DevOps Tooling: Discover and Practice (Online & Classroom Exam)	58%
Activity 4.2: DevOps Tooling: Apply & Prove (Online & Workplace)	66%

By the end of month 9:

A learner should have completed **66%** of their programme



100% PROGRESS

MONTH 12

Completion by the end of month 12	Completion %
Activity 5.1: DevOps Infrastructure: Discover and Practice (Online & Classroom Exam)	75%
Activity 5.2: DevOps Infrastructure: Apply & Prove (Online & Workplace)	83%
Activity 6.1: DevOps Cloud Specialisation: Discover and Practice (Online)	88%
Activity 6.2: DevOps Cloud Specialisation: Apply (Online & Workplace)	94%
Survey: On-programme Evaluation	Complete
SPC: EPA Overview & Summative Portfolio Consolidation	99%
EPAP: Project and Professional Discussion preparation	100%
Survey: End of programme	Complete

By the end of month 12:

A learner should have completed **100%** of their programme



Qualification
Awarded



MONTH 16

Completion by the end of month 16	Completion %
Project submitted to BCS	Completed
Initiate professional discussion preparation	Completed

By the end of month 13:	
Has the learner completed the project?	YES ●
	NO ●

QA Apprenticeships does not formally grade the apprenticeship, this is the responsibility of the End-Point Assessment organisation.

MONTH 17

Completion by the end of month 17	Completion %
Interview	Completed

MONTH 18

Completion by the end of month 18	Completion %
Result from BCS	Completed



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